

REMARKS

Claims 1-20 remain for further consideration. No new matter has been added.

The rejections and objections shall be taken up in the order presented in the Official Action.

1-2. The claim to priority to U.S. application 10/121,935, filed April 12, 2002, has been removed.

3-4. Claims 1-7 and 15-20 currently stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Published Patent Application 2002/0157950 to Frerichs (hereinafter "Frerichs") in view of U.S. Patent 6,525,390 to Tada et al. (hereinafter "Tada").

Claims 1 and 15

Independent claims 1 and 15 both recite a sensor. The sensor of claim 1 includes:

"a substrate;
a drain disposed on the substrate;
a source disposed on the substrate;
a channel region disposed between the drain and the source;
a conductive guard ring disposed outside the channel region;
a sensitive gate layer with a potential that depends on the parameter;
an air gap disposed between the gate layer and the channel region; and
an insulating layer disposed between the guard ring and the channel region,
the insulating layer having a surface on a portion of which is disposed a ring structure
having a surface conductivity different from a surface conductivity of a remaining
portion of the surface of the insulating layer to thereby increase an amount of time in
which the potential of the channel region equals the potential of the conductive guard
ring." (cl. 1).

The sensor of claim 15 includes:

"a source;
a drain;
a channel region between the source and the drain;
a conductive guard ring outside the channel region;
a gate layer with a potential that depends on the ambient parameter;
an air gap between the gate layer and the channel region; and

an insulating layer between the guard ring and the channel region, the insulating layer having a surface on a portion of which a ring structure is arranged having a surface conductivity different from a surface conductivity of a remaining portion of the surface of the insulating layer to thereby increase an amount of time in which the potential of the channel region equals the potential of the conductive guard ring.” (cl. 15).

The Official Action contends, with respect to both claims 1 and 15, that Frerichs and Tada together disclose all of the features of both claims 1 and 15. (Official Action, pgs. 3-4). The Official Action concludes that “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to improve upon the ring structure of Frerichs ‘950 by using the teachings of Tada to create a field plate with annular ring structures of a second conductivity type upon it. Motivations to do so include the desirability of having a uniform potential gradient across the field oxide film (Tada col. 18 ln. 16), avoiding voltage concentrations between the gate and drains regions, and reduction of the intensity of the electric fields associated with PN junction termination.” (Official Action, pgs. 3-4, emphasis added).

However, it is well-settled that there must be some suggestion or motivation within the cited references to combine those references to arrive at the claimed invention.¹ The suggestion or motivation to combine the references must not be a hindsight reconstruction of isolated disclosures within the prior art.² Indeed, the lack of an appropriate motivation or suggestion to combine gives rise to an inference that the combination is the product of hindsight.³

As applied here, it is submitted that there is no suggestion or motivation in either Frerichs or

¹ ACS Hosp. Systems, Inc. v. Montefiore Hosp., 221 USPQ 929, 933 (Fed. Cir. 1984), “Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can only be combined if there is some suggestion to do so.”

² In re Fritch, 23 USPQ2d 1780 (Fed. Cir. 1992), “[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention”, quoting In re Fine, 5 USPQ2d 1596 , 1600 (Fed. Cir. 1988).

³ In re Rouffet, 47 USPQ2d 1453, 1458 (Fed. Cir. 1998).

Tada to combine them to meet the features of independent claims 1 and 15. This is primarily because of the dissimilarities of teachings and purpose of Frerichs and Tada. Frerichs relates to a sensor for measuring a gas or ion concentration. On the other hand, Tada focuses on preventing the breakdown voltage from lowering in a semiconductor device. These disparate goals together with the largely disparate technical teachings of each reference, evidence a lack or motivation to combine Frerichs and Tada to meet the present invention. It is submitted that in reality the Official Action is contending an impermissible hindsight reconstruction of Frerichs and Tada in an attempt to render claims 1 and 15 obvious.

The Official Action puts forth three separate motivations to combine Frerichs and Tada. Each of these is addressed in turn. The first alleged motivation is "*the desirability of having a uniform potential gradient across the field oxide film (Tada col. 18 ln. 16).*" (Official Action, pg. 3). While this may be an explicitly stated desire of Tada, Frerichs is not concerned in the least with having a uniform potential gradient across the field oxide film. Instead, Frerichs is concerned with the adjustment of the amount of time it takes the potential of the FET to reach the potential of the guard ring, similar to claims 1 and 15 of the present application. (see, for example, column 1, lines 56-64 of Frerichs). That is, Frerichs is concerned with the exact opposite of Tada – to control an RC time to eventually have an equal potential between the FET and the guard ring, and not to have a potential gradient across the field oxide film. As such, Frerichs actually teaches away from Tada, which further evidences a lack of any suggestion or motivation to combine Frerichs and Tada.

The second alleged motivation in the Official Action to combine Frerichs and Tada is "*avoiding voltage concentrations between the gate and drains regions.*" (Official Action, pg. 3). However, the Official Action fails to point to a specific location within either reference as a basis for this statement. Nevertheless, this alleged motivation amounts to nothing more than a mere vague

and general statement that may apply to any FET. As such, this type of broad and general statement fails to provide a specific and valid suggestion or motivation to combine Frerichs and Tada to meet the particular features of claims 1 and 15 of the present application.

Finally, the third alleged motivation in the Official Action to combine Frerichs and Tada is “*reduction of the intensity of the electric fields associated with PN junction termination.*” (Official Action, pg. 3). Similar to the alleged second motivation discussed above, the Official Action fails to point to a specific location within either reference as a basis for such statement. “*Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching suggestion or incentive supporting the combination.*” In re Geiger, 2 U.S.P.Q.2d 1276, 1278 (Fed. Cir. 1987). “*Although the Commissioner suggests that [the structure in the primary prior art reference] could readily be modified to form the [claimed] structure, [t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.*” In re Laskowski, 10 U.S.P.Q.2d 1397, 1398 (Fed. Cir. 1989), citing In re Gordon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984). In addition, “[w]hen the incentive to combine the teachings of the references is not readily apparent, it is the duty of the examiner to explain why the combination of the reference teachings is proper.” Ex parte Stone, 2 U.S.P.Q.2d 1788, 1790 (Bd.App. & Int’f 1986) (emphasis added).

As noted above, it is fundamental that obviousness can not be established absent some teaching to combine the references, or a suggestion or incentive supporting the combination of references. See In re Geiger, at 1278 (Fed. Cir. 1987). In the instant case the Official Action is lacking the necessary factual, non-conclusionary explanation why the combination of the Tada and Frerichs is proper. Hence, it is respectfully submitted that a prima facia case of obviousness has not been presented since there is no proper teaching, suggestion or incentive that would lead one of

ordinary skill in the art to modify Tada based upon the teachings of Frerichs to create the claimed invention.

Therefore, as these three alleged motivations to combine Frerichs and Tada have no basis and are without merit, the contention in the Official Action that Frerichs and Tada can be combined to meet the features of independent claims 1 and 15 of the present application amounts to nothing more than an impermissible hindsight reconstruction of Frerichs and Tada. In light of the foregoing, it is respectfully submitted that the obviousness rejection of independent claims 1 and 15 is moot and that claims 1 and 15, together with their respective dependent claims, claims 2-7 and 16-20, are in condition for allowance and should be passed to issuance.

5. Claims 8-14 currently stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Frerichs and Tada as applied to claims 1-7 above, and further in view of a technical document to Paris, R. (hereinafter “Paris”).

Claim 8

Independent claim 8 recites a sensor for measuring a concentration of an ambient parameter.

The sensor includes:

“a substrate;
a channel region formed in the substrate;
a conductive guard ring arranged outside the channel region;
a sensitive gate layer whose potential depends on the concentration of the ambient parameter, an air gap disposed between the gate layer and the channel region;

an oxide layer disposed between the guard ring and the channel region, a surface of the oxide layer having a ring structure arranged on a portion thereof, the ring structure having a surface conductivity different from a surface conductivity of a remainder of the surface; and

a source and a drain forming a field-effect transistor, the transistor being spatially separated from the air gap between the gate layer and the channel region, the transistor having a gate that is connected by an electrode to the channel region, the different surface conductivities between the ring structure and the remainder of the surface increasing an amount of time in which the potential of the channel region equals the potential of the conductive guard ring.” (cl. 8, emphasis added).

The Official Action contends that “[t]he combination of Frerichs ‘950 and Tada does not teach a source and drain forming a field-effect transistor, the transistor being spatially separated from the air gap between the gate layer and the channel region, the transistor having a gate that is connected by an electrode to the channel region. Paris discloses in figure 1 a source and drain forming a field-effect transistor (item FET in figure), the transistor being spatially separated from the air gap (area bounded by the gate, nitride, and distance pieces) between the gate layer and the channel region (area under the substrate between the guard rings), the transistor having a gate that is connected by an electrode to the channel region.” (Official Action, pgs. 5-6). However, a fair and proper reading

of the combined references fails to suggest the subject matter of the claimed invention.

Upon a fair and proper reading, Paris, and in particular the combination of Tada, Frerichs and Paris fails to disclose or suggest the features of claim 8 emphasized above of “*an air gap disposed between the gate layer and the channel region, the transistor being spatially separated from the air gap between the gate layer and the channel region, the transistor having a gate that is connected by an electrode to the channel region.*” Instead, Paris discloses in FIG. 1 a gate with a sensing layer on the top portion of the device. Disposed underneath the sensing layer is an air gap formed by the inclusion of two distance pieces that sit on top of a layer of Si₃N₄ and also abut the bottom of the sensing layer. Underneath the layer of Si₃N₄ is an insulator layer having embedded therein a floating electrode that comprises one capacitor plate directly connected to the gate of a measuring FET, which is disposed to the right side of this structure. A capacitive guard is disposed below the insulator layer. The floating electrode, which is brought out to the right side of the device and over and past the “FET” (explicitly identified as such in FIG. 1 of Paris), is connected to an injector electrode. (See the “Summary” page of Paris, the paragraph labeled “Experimental,” and see also page 1 of Paris, the paragraph labeled “Abstract” and the last full paragraph of column 2 for the text that corresponds to the disclosure of FIG. 1 of Paris.)

From this, it is clear that nowhere in Paris is there disclosure or suggestion of a channel region disposed in relation to the air gap and the gate layer, a feature that is recited in claim 8. In particular, there is no basis in Paris for the contention in the Official Action that the channel region is the “*area under the substrate between the guard rings.*” (Official Action, pg. 6.) As such, it follows that there is no disclosure in Paris that the transistor is spatially separated from the air gap between the gate layer and the channel region, nor is there disclosure or suggestion in Paris that the transistor has a gate that connected by an electrode to the channel region, features recited in claim 8. Indeed,

Paris fails to disclose or suggest that its electrode is connected to any type of channel region, be it located in disposition with the air gap or otherwise. Further, Paris fails to discuss any type of "channel region" at all in conjunction with the device of FIG. 1. As a result, it can be assumed, without admitting as much, that any type of channel region would reside in the vicinity of the FET, which is illustrated in FIG. 1 of Paris on the right side of the air gap structure and away from that air gap structure, and thus that the channel region would not be disposed in the vicinity of the air gap.

In light of the foregoing, it is respectfully submitted that the obviousness rejection of independent claim 8 is moot and that claim 8, together with its dependent claims, claims 9-14, are in condition for allowance and should be passed to issuance.

For all the foregoing reasons, reconsideration and allowance of claims 1-20 is respectfully requested.

If a telephone interview could assist in the prosecution of this application, please call the undersigned attorney.

Respectfully submitted,

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